PREVALENCE OF UNDERNUTRITION AMONG ELDERLY PERSONS IN ACCRA

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SUMMARY

We assessed the nutritional status of 514 elderly persons in Accra, mean age 72 years, to provide more information on elderly persons in Ghana. The sample population comprised 514 non-institutionalised ambulatory elderly persons from fifteen communities in Accra. Body mass index (BMI) was used to assess the prevalence of under-nutrition among the subjects. We compared the results obtained using BMA (body mass index generated from armspan) as a possible substitute for BMI in non-ambulatory elderly persons. Results showed that the median BMI and BMA for males were both below the cut-off below which under-nutrition is diagnosed. Using BMI to assess nutritional status, 48% of the elderly persons were in the undernourished category. Many more elderly males (62%) than females (41%) were undernourished. The proportion severely undernourished was high (22%) and can be categorised as having grade III chronic energy deficiency (CED). Those mild-to-moderately undernourished (26%) were also many. Among the elderly persons, there was a high correlation between armspan and height (r=0.81) and a stronger correlation (r=0.99) between BMI and BMA in both sexes. The under-nutrition rates observed using BMA were similar to that observed for BMI. Armspan is thus an effective alternative to height in diagnosing chronic energy deficiency in the elderly. The high under-nutrition rate observed among the study population is an attestation of the nutritional vulnerability of the Ghanaian elderly.

Keywords: Elderly, undernutrition, body mass index, armspan, weight.

INTRODUCTION

Elderly persons have been classified as people above age 65 years while older persons have been categorised as people over 60 years[1]. Aging is a natural process and it is characterised by changes in physiological, physical and psychological states[2]. In some elderly persons, there is a reduction in the efficiency of vital organs such as the kidney, lungs and gastrointestinal tract. A decline in sensory perception and mental acuity may also occur. The reduced immune competence, which may occur, makes the elderly person more susceptible to infectious diseases[3]. These, together with chronic degenerative diseases, motivate increased use of prescription drugs. There is thus, the existence of drug-nutrient interactions that limit the ability of the elderly person to utilize nutrients optimally. Food intake and food pattern of elderly persons are influenced by financial status, physical ability, physiological and psychological states[2]. In aging, muscular and skeletal changes occur and may contribute to functional decline[4]. This consequently affects food acquisition and preparation. Either acting singularly or in unison, these factors adversely alter nutrients intake making the elderly person more susceptible to undernutrition[2]. In parts of the world, elderly person play invaluable roles in society as traditional heads, family and community counsellors and as alternative care-givers[5,6].

There is increasing global interest in issues concerning the wellbeing of elderly persons[7], because the population of elderly persons is the fastest growing sector of world population[8,9]. The population of Africans over 60 years will increase from 22.9 million in 1980 to 101.9 million in 2025, an increase by a factor of 4.4 compared to a factor of 2.1 for developed countries over the same period[8]. The population of Africans over 60 years is reported to double by 2020 and those 75years and over will increase by over 500% in West Africa[10]. Ensuring nutritional, health and general wellbeing of the elderly can contribute immensely to socio-economic development.

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Due to senescent changes and some clinical conditions, BMI determination in some elderly persons using height is not possible. Under such conditions, BMA may be determined from armspan and used for assessment of nutritional status. Hence we assessed nutritional status of this elderly sample using both BMI and BMA to examine the suitability of BMA as a proxy for BMI.

Hitherto, a comprehensive study and thus information on the nutritional status of the elderly Ghanaian was lacking. This paper provides information on anthropometric characteristics and prevalence of undernutrition among elderly persons in Ghana.

METHODOLOGY

Subjects, Locale and Sampling

A cross-sectional survey was undertaken to study the prevalence of undernutrition and some anthropometric characteristics of 514 elderly persons in 15 communities in Accra. These were self-dependent, non-institutionalised elderly persons, age 65-90 years. Participating communities in Accra were selected through a cluster sampling technique[11,12]. All subjects who met the inclusion criteria were included in the study. To participate in the study, the elderly person must be a resident of Accra, must not be suffering from memory loss, edema or kyphosis, and must have or been helped to complete an informed consent form for participation.

Data Collection

Anthropometric data collection

Anthropometric measurements done included armspan, height and weight measurements. Standard anthropometric procedures for the elderly, documented by Ismail and Manandhar[13] were used. The anthropometric measurements were done in duplicate.

Body weight measurement

Body weight measurements were done near a support to assist the elderly person mount the platform of the weighing scale[13]. Body weight was measured with the subject standing unsupported on adult weighing scale (SECA 890) placed on a smooth level ground. With the subject standing upright unsupported on the weighing scale, feet together, motionless, wearing ordinary light clothing and straight ahead, the weight was recorded[13].

Standing height measurement

The standing heights of the elderly persons were measured using a stadiometer (Leicester Height Measure), calibrated in millimetres (minimum scale: 0.1cm), in accordance with a standard procedure documented for the elderly[13]. Measurements were done with the subject in ordinary light clothing and without footwear. The subject stood upright on a firm level platform of the stadiometer and without raising heels, the sliding headpiece of the stadiometer was moved to touch the crown of the head gently but firmly and readings were recorded. Readings were taken at the highest point of the head with the subject looking straight ahead along the Frankfort plane[14].

Armspan measurement

Subject, wearing light clothing, stood with the back against a wall or a smooth upright support. With arms, wrists and fingers facing forward and horizontal in straight line and looking straight at eye level, a flexible non-stretch steel tape was then extended from the tip of the middle finger of the right arm straight across the chest and along the left arm to the tip of the middle finger of the left arm. With the tape taut and arms straight and horizontal, the armspan was recorded to the nearest 0.1cm. Measurements were done in duplicate. values differing more than 0.5cm were rejected and measurement repeated[13].

Mid-upper arm circumference (MUAC)

The MUAC was measured in accordance with laid down procedure[13]. Initially subject was made to bend the left arm at 90°C angle and the lower arm placed across the abdomen. The mid point of this upper arm was then determined as the mid point of the distance between the acromion process of the scapula and olecranon process of the ulna. Next, subject was made to release the arm to hang loosely by the side and a flexible non-stretch tape was passed around the located mid point to take the measurement. Measurement was done in duplicate and the average recorded.

Analyses of the data collected

Data analyses were by means of Intercool STATA for windows 5.0 (STATA Corporation, Texas, USA). Pearson's linear correlation analysis and multiple linear regressions were used to ascertain relations between variables. All findings were statistically tested for significance at $P<0.05$. BMI was calculated using the formula; BMI = weight (in kg)/height^2 (in meters). Armspan values were used to calculate BMA as follows; BMA = weight (in kg)/armspan^2 (in meters)[15]. The calculated indices, BMI and BMA, had distribution skewed on the right, hence the median values (rather than the mean) was used to indicate the central value of the distributions in the study population (Bailey and

Ferro-Luzzi, 1995). The cut-off limits for the indices to indicate undernutrition were; BMI<18.5 = underweight; 17-18.4 = grade I; 16-16.9 = grade II; and < 16.0 – grade III CED or severe undernutrition[14,15,16]. Cut-offs for BMA were 1.0 unit less as for BMI[15].

RESULTS AND DISCUSSION

Tables 1 and 2 give the background characteristics of the elderly persons in the study. The higher proportion of females reflects their higher proportion in such elderly populations. The mean ages of the males and females were 73 and 72 years respectively. The median BMI and BMA values for males were below the cut-off limits below which undernutrition is indicated.

Table 1 Background characteristics of the elderly subjects in the study (n=514)

Characteristic	Percent of subjects (%)
Sex category	
Male	35.07
Female	64.93
Age distribution (years)	
65-74	71.48
75-84	24.66
85+	3.85
Highest educational level	
None	46.90
Primary	17.44
Middle	25.39
Secondary/Technical	8.14
Tertiary	2.13
Tribal lineage	
Akan	6.17
Ewe	5.78
Ga-Adangme	83.62
Northerner	3.66
Foreigner	0.77
Pre-retirement occupation	
Unemployed	3.33
Trader/business person	20.20
Petty trader	25.29
Artisan[1]	31.37
Office work[2]	12.16
Professional[3]	7.45

[1]Artisan: Including petty trading, mason, carpentry, goldsmith, tailor, dressmaker, hairdresser, farmer, fisherman, baker, plumber, electrician, driver.
[2]Office work: Office clerk, typist, secretary, receptionist, telephonist and similar jobs.
[3]Professional work: Policeman, Security work, Teacher, Lawyer, Pilot and Surveyor.

Table 2 Background anthropometric characteristics of the elderly subjects in the study

Parameter	Male (n=180)		Female (n=334)	
	Mean	Std	Mean	Std
Weight (kg)	59.77	11.64	62.35	14.47
Height (cm)	165.8	6.81	154.56	6.51
Armspan (cm)	178.17	8.51	156.48	7.64
MUAC (cm)[1]	27.54	5.66	30.51	4.81
	Median	Range	Median	Range
BMI (kg/m^2)	17.72	12.98 - 25.90	19.52	15.33 - 25.91
BMA (kg/m^2)	16.57	10.74 - 24.15	18.09	13.16 - 24.15

Using BMI to assess nutritional status, specifically wasting, a large proportion of the elderly (48%) was undernourished (Figure 1).

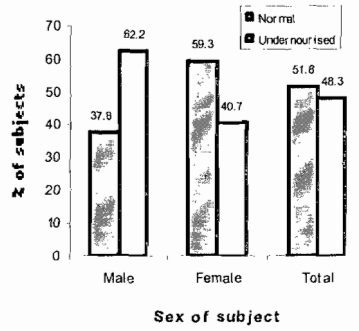

Figure 1 Prevalence of undernutrition among the elderly assessed using BMI (cut-off; BMI<18.5 kg/m^2)

The prevalence of undernutrition was more pronounced among the males (62%) than the females (41%). A substantial proportion of the elderly persons was severely undernourished (22%), and can be categorised among grade III chronic energy deficiency (CED) (Table 3). The high proportion with mild-to-moderate CED (27%) could not be overlooked. A rapid nutritional assessment of elderly persons in Ethiopia also observed severe undernutrition, 30%, among of elderly persons[1], a proportion similar to what we have observed. In their report, they found undernutrition to be particularly acute for older women (32%) than for older men (19%). This observation is the reverse of what we observed among elderly persons in Ghana, in which acute undernutrition was more prevalent among males (30%) than females (17%). A similar prevalence of severe undernutrition was found among elderly men (32.3%) and women (12.8%) in Nairobi[17]. Nevertheless, severe undernutrition was similar in both males (22.9%) and females (20.5%) in other parts of Kenya[18]. In comparison to the results observed in Ghana a recent study in rural Malawi showed a similar un-

dernutrition prevalence among elderly males (33.7%) and females (27.7%)[19]. In cognizance of the very high undernutrition rate observed among the elderly persons, it is inferred that the Ghanaian elderly person is acutely nutritionally vulnerable.

Table 3 Classification of undernutrition among the subjects using BMI

Nutritional status	Male (%) n=180	Female (%) n=334	Total (%) n=514
Severely wasted (BMI < 16.0)	30.00	17.07	21.60
Moderately wasted (BMI 16.0-17.0)	12.22	11.98	12.06
Mildly wasted (BMI 17.0-18.4)	20.00	11.68	14.59
Normal (BMI 18.5-30.0)	37.78	55.39	49.22
Overweight (BMI>30.0)	0.0	3.89	2.53

The presence of long limbs in some tribes leads to over-estimation of BMI values[20], but this characteristics is uncommon among Ghanaians. Also Ghanaians who are normally nourished have been observed to have normal nutritional status assessed by BMI[21]. Therefore the results of this study are the true reflection of the nutritional status of the elderly persons in Ghana.

There was a high correlation between armspan and height (r=0.81) in both sexes and a stronger correlation (r=0.99) between BMI and BMA was used (Figure 2).

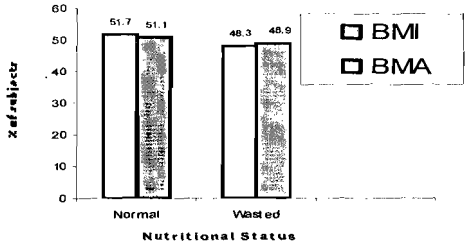

Figure 2 Comparison of nutritional status assessed using BMI with BMA (sexes combines)

This observation is in consonance with the high correlation between BMI and BMA in both males and females. This high correlation promotes BMA as a proxy for BMI in the nutritional status assessment of non-ambulatory persons.

Regression analysis was done to generate gender-specific regression equations from height and from armspan persons:

- Male: BMI = (BMA x 1.050) – (Age x 0.002) + 0.539 r = 0.990
- Female: BMI = (BMA x 1.061) + (Age x 0.006) - 0.228 r=0.991

Knowing the armspan value and age of the elderly person, BMI can be calculated using the formulas above.

The prevalence of undernutrition was observed to increase with advancing age in both sexes among the study sample (Table 4).

Table 4 Undernutrition rate by age groups and sex using BMI (Cut-off; BMI<18.5)

Sex	Age group years	Number in category	Normal	Undernourished
Male (n=180)	65-74	122	43.44	56.56
	75-85	55	30.91	69.09
	>85	5	0.0	100.00
Female (n=334)	65-74	249	62.65	37.35
	75-85	73	52.05	47.95
	>85	15	46.67	53.33
Total (n=514)	65-74	371	56.33	43.67
	75-85	128	42.97	57.03
	>85	20	35.00	65.00

However, this trend was not clear among elderly populations in other parts of Africa, such as Kenya[18]. With aging, physical ability reduces and diseases of old age may increase, while financial competence may dwindle due to exit from wage earning occupation. It is thus possible that with advancing age, nutritional status may alter adversely if there are no adequate social support systems. In less technically developed countries, most elderly persons are undernourished because they lack the economic means to ensure an adequate daily diet. The high undernutrition rate observed among our study population is an attestation of the nutritional vulnerability of elderly persons in Ghana and other parts of the developing world.

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